

that the greatest of all geographers were sailors, and we venture to adduce the names of Magellan, Columbus, Drake, Baffin, Davis, Hudson, Cook, Franklin, Ross, and McClintock in support of it, not to mention any names of those now living. Once more we demur to the use, in any literal sense, of such metaphorical expressions as "early Persian Department for geographical intelligence." The early Persian expeditions that we know anything about—namely, those against Greece—relied on spies and on guides picked up at the moment. Finally, where so much is said about Greeks and Alexander one is disappointed to find the famous Macedonian pike (*sarissa*) disguised as "*sarina*"; and *ballistæ* and *cata-peltæ* (did Macedonians use the Roman *ballista*?) translated as "mounted infantry and artillery"; and Nearchus appearing now (correctly enough for those who like that fashion) as *Nearkhos*, and now (to suit no fashion) as *Nearkos*. In the case of a name like Nearchus, the free and easy fashion approved by Mr. Tony Weller is hardly to be commended. These things are blemishes which we should not care to remark if the book were not so good and so fresh in its essentials.

GENERAL BIOLOGY.

Allgemeine Biologie. By Oscar Hertwig. Dritte Auflage. Pp. xviii+728. (Jena: Gustav Fischer, 1909.) Price 16 marks.

IN the review of the second edition of this work, which appeared in this journal in 1906, it was pointed out that for any single man to undertake to give a circumstantial and critical account of the numerous problems of modern biology, and to support the conclusions arrived at by a sufficient record of the facts on which they are founded, is too stupendous a task, and one which certainly cannot be adequately carried out in a single volume. The third edition of Dr. Oscar Hertwig's book follows soon after the second, and it is to be inferred that it has been useful to a large circle of readers in Germany and elsewhere, though it has not attracted so much attention in England. It is doubtful whether the third edition will be more successful in this country than its predecessor. It is enlarged by the addition of eighty pages, and the illustrations in the text, which are well chosen and for the most part admirably executed, have been increased in number from 371 to 435.

Dr. Hertwig is a lucid writer, and has a style which attracts the reader and carries him easily through many difficult places, but in almost every chapter he leaves a certain sense of disappointment. There is a vast amount of information, and the argument is clear, and in many places convincing, but the detail is insufficiently worked out. This, perhaps, is no great fault in a text-book, if such information as is given is founded on the best and most recent authorities, and the references to literature are sufficiently full and up-to-date. But it cannot be said that this is always the case. To take some examples,

the author informs us in the preface that the sections on the maturation divisions of the germ-cells, on natural and artificial parthenogenesis, on hybridism and the biogenetic law, have been largely re-written and revised in this edition.

In the section on the maturation divisions we are disappointed in finding that the discussion turns mainly on the phenomena observed in *Ascaris*. The work of vom Rath, Rückert, and Korschelt is also dealt with, but there is no mention of Farmer and Moore's important papers on the Maiotic phase in animals and plants, and their papers, which surely are old enough to be incorporated in a text-book published in 1909, are not even quoted in the list of literature. The section on natural and artificial parthenogenesis is more satisfactory, as a fair summary is given of the more important experimental researches on this subject up to the year 1908. The discussion of the results is, however, somewhat unconvincing.

Mendel's law, which was ignored in the second edition, is concisely dealt with in the latter half of chapter xiii. Here only a few simple cases are quoted to illustrate Mendelian principles, and no discussion of more complicated and unconformable cases is attempted. As in many other parts of the book, the experiments of Continental authors are quoted, but the large amount of English work on the subject is not taken into account.

Dr. Hertwig is quick to take advantage of the results of Mendelian work in support of his own theories of inheritance, but it is not always easy to understand in this connection, as in many others, what his real opinion is. It might be described, in Mendelian terms, as a polyhybrid of several theories promulgated by different authors; and sometimes one is inclined to think that, under stress of argument, his system resolves itself, by a process of segregation, into its original elements. He maintains, as he was one of the first to assert, that the chromosomes are the bearers of the heritable qualities of the organism, and it may be said in this connection that he disposes too easily of the evidence furnished by Crampton, E. B. Wilson, and others, that specific organ-forming materials are located in the cytoplasm of the egg. But while admitting the existence of a nuclear idioplasm, he will have nothing to do with Weismann's theory of biophors and determinants, but holds with Nägeli that the idioplasm has a micellar structure, and that it is distributed equally to every product of cell-division. None the less, he speaks of particles (*Teilchen*) which are bearers of inheritable qualities, and comments on the fact that Mendelian experiments show that these particles must be mobile and capable of forming new combinations. Hence, he says, it is clear that the chromosomes cannot retain their individuality, but must be regarded as tactical combinations of smaller units. Few will be disposed to quarrel with this conclusion, but it is not obvious wherein these "smaller units," capable of entering into tactical combinations, and representative of the specific or racial characters (*Merkmale*) of the adults, differ from Weismann's determinants.

Here, as in several other places, Dr. O. Hertwig appears to be inconsistent, but it would be an injustice to press this charge of inconsistency too closely. He is a champion of an epigenetic theory of development, and argues with admirable clearness in favour of the view promulgated at the same time by Driesch and himself, that the destiny of any given cell in a developing organism is a function of its position. At the same time, he brings into account the indisputable fact that the characters of the organism, and therefore of the cells composing it, are determined beforehand by the constitution of the fertilised ovum from which it is derived. In other words, he admits preformation, but preformation tempered by the mutual interaction of parts and the influence of external conditions.

There are many indications that the impartial position adopted by Dr. O. Hertwig is the right one, and, after all, it is the position taken up by Darwin, who wrote that "there are two factors, the nature of the organism, which is much the more important of the two, and the nature of the conditions." But latterly opinion has been sharply divided on these questions, and to partisans of the preformationary or epigenetic schools any attempt to reconcile such apparently irreconcilable theories exposes the author to the charge of inconsistency. In truth, it is very difficult to draw certain conclusions from the available evidence, much of which appears to be contradictory. It is the chief merit of Dr. Hertwig's work that he refuses to take extreme views, and no better exposition of the middle position can be found than is contained in this volume.

COMMERCIAL ORGANIC ANALYSIS.

Allen's Commercial Organic Analysis. A Treatise on the Properties, Modes of Assaying, and Proximate Analytical Examination of the Various Organic Chemicals and Products employed in the Arts, Manufactures, Medicine, &c. Fourth edition, vol. i. Edited by Dr. H. Leffmann and W. A. Davis. Pp. x+576. (London: J. and A. Churchill, 1909.) Price 21s. net.

THE first volume of the last edition of this well-known treatise was issued in 1898, and was remarkable for the introduction of two features, which have become the most striking characteristics of this first volume of the new edition. These are the recognition of the fact that the subjects to be dealt with are so numerous and important that a single compiler can no longer cope with them, and that in publishing a large and important work of this kind in English it is desirable to endeavour to meet the needs both of readers in this country and in the United States. This latter consideration is a very important one, and it is to be hoped that its recognition will facilitate the re-publication of other large works of reference in English.

This volume is divided into ten sections, and each of these is written by an expert in that branch. It will be a matter of satisfaction to those familiar with "Allen" to find that in bringing the subject-matter

up to date it has been possible to retain the old arrangement. The introduction is written by the English editor, Mr. Davis, and shows perhaps less change than most of the other sections, the most important additions being useful chapters on (1) refractometers, (2) spectrometers and spectrographs, and (3) the determination of moisture, "crude fibre," and ash, all these being of sufficient general importance to warrant their discussion in the introduction. This section is, on the whole, a very satisfactory piece of work, though it is rather doubtful whether it was worth while to devote about three pages (53-6) to an illustrated description of an arrangement for maintaining a temperature constant to within a few thousandths of a degree, since the commercial analyst is not likely to want refinements of this description in practice. Further, the space devoted to the "Employment of Immiscible Solvents" (pp. 79-82) might have been much curtailed, as the present-day analyst is probably perfectly familiar with the separating funnel and its use. The table at the end of this section is reprinted from the third edition, and should have been omitted, as it is too general to be of any value, and, moreover, contains the inaccurate statement that cantharidin, picrotoxin, and santonin are glucosides. It is also a mistake to refer to "saponin" as if this were a single definite substance.

Dr. Leffmann, the American editor, contributes two sections, the one entitled "Neutral Alcoholic Derivatives," and the other, not very happily named, "Acid Derivatives of the Alcohols."

Notable additions are the very useful article on "Yeast" by Mr. Emil Schlichting, and the excellent section on "Papers and Paper-making Materials" by Mr. Sindall. Mr. G. C. Jones contributes the sections on "Alcohols" and "Wines and Potable Spirits." Both these seem to contain all the data an analyst is likely to need, but in the second section something might have been said regarding the analytical work on rum carried out in recent years in Jamaica and British Guiana.

The remaining sections are those on "Sugars" and "Starch and its Isomerides," both written by Dr. E. F. Armstrong. In the main, these are excellent *résûmés* of the present position of the chemistry of these subjects, and the omissions are of a trifling character. In the first some reference should have been made to the detection and estimation of such glucosides as salicin and strophanthin, used in medicine, but possibly it is intended to deal with these under "Drugs" in a later volume. Under "Starch" no mention is made of the analytical characters of the "sago substitutes" that are now prevalent in commerce. The article on gums in this section is little more than a replica of that in the third edition, and it is unfortunate that the author did not take the opportunity of correcting the errors in it.

The book as a whole is very well edited, but there are a few curious mistakes; thus in three places the name of one of the authors is written "Schlichting," and in the fourth and most important place, viz. at the head of his contribution, it is given as "Schlighting." The heading of one section is printed